

WHAT IS CLAIMED IS:

1. A manufacturing method of a phase shift mask,  
comprising:

seeking relationship of optical conditions of  
an exposure optical system used for exposure and a mask  
structure with displacement of a pattern to be  
transferred by exposure;

finding said optical conditions and said mask  
structure that can limit displacement of said pattern  
within a required range, taking manufacturing errors of  
the mask into consideration;

examining the optical conditions and the mask  
structure, obtained, whether they ensure a required  
exposure tolerance and a required focal depth; and

executing fabrication of such a mask to  
obtain said mask structure when the result of the  
examination is acceptable.

2. The manufacturing method of a phase shift  
mask according to claim 1 wherein said optical  
conditions include, at least, numerical aperture and  
partial coherence factor.

3. The manufacturing method of a phase shift  
mask according to claim 1 wherein said phase shift mask  
is a Levenson phase shift mask.

4. The manufacturing method of a phase shift  
mask according to claim 3 wherein said Levenson phase  
shift mask is of a substrate excavation type, and said

mask structure id regulated by amount of excavation of a substrate.

5. The manufacturing method of a phase shift mask according to claim 1 wherein said Levenson phase shift mask is of a phase shifter-added type, and said mask structure is regulated by thickness of a phase shifter.

6. A method of making a resist pattern through exposure using phase shift mask, comprising:

seeking relationship of optical conditions of an exposure optical system used for exposure and a mask structure of said phase shift mask with displacement of a pattern to be transferred by exposure;

finding said optical conditions and said mask structure that can limit displacement of said pattern within a required range, taking manufacturing errors of the mask into consideration;

examining the optical conditions and the mask structure, obtained, whether they ensure a required exposure tolerance and a required focal depth; and

when the result of the examination is acceptable, fixing said exposure optical system to the optical conditions selected, then actually manufacturing said phase shift mask having the mask structure selected, and conducting exposure using said exposure optical system and said phase shift mask.

7. The method of making a resist pattern

according to claim 6 wherein said optical conditions include, at least, numerical aperture and partial coherence factor.

8. The method of making a resist pattern according to claim 6 wherein said phase shift mask is a Levenson phase shift mask.

9. The method of making a resist pattern according to claim 8 wherein said Levenson phase shift mask is of a substrate excavation type, and said mask structure is regulated by amount of excavation of a substrate.

10. The method of making a resist pattern according to claim 8 wherein said Levenson phase shift mask is of a phase shifter-added type, and said mask structure is regulated by thickness of a phase shifter.

11. A manufacturing method of a semiconductor device having a step of making a resist pattern through exposure using a phase shift mask;

seeking relationship of optical conditions of an exposure optical system used for exposure and a mask structure of said phase shift mask with displacement of a pattern to be transferred by exposure;

finding said optical conditions and said mask structure that can limit displacement of said pattern within a required range, taking manufacturing errors of the mask into consideration;

examining the optical conditions and the mask

structure, obtained, whether they ensure a required exposure tolerance and a required focal depth; and

when the result of the examination is acceptable, fixing said exposure optical system to the optical conditions selected, then actually manufacturing said phase shift mask having the mask structure selected, and conducting exposure using said exposure optical system and said phase shift mask.

12. The manufacturing method of a semiconductor device according to claim 11 wherein said optical conditions include, at least, numerical aperture and partial coherence factor.

13. The manufacturing method of a semiconductor device according to claim 11 wherein said phase shift mask is a Levenson phase shift mask.

14. The manufacturing method of a semiconductor device according to claim 13 wherein said Levenson phase shift mask is of a substrate excavation type, and said mask structure is regulated by amount of excavation of a substrate.

15. The manufacturing method of a semiconductor device according to claim 13 wherein said Levenson phase shift mask is of a phase shifter-added type, and said mask structure is regulated by thickness of a phase shifter.